COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

PROGRAMME STRUCTURE & SYLLABUS
[2025 ADMISSIONS ONWARDS]

M.TECH COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE & ARTIFICIAL INTELLIGENCE) (Part-Time)

Program Outcomes (PO) For M.Tech. Computer Science & Engineering (Data Science & Artificial Intelligence) (Part-Time)

After the completion of M.Tech. programme, the students will be able to:

PO1: Elicit deeper and current knowledge through research/exploration leading to development work with a motivation to solve practical problems.
PO2: Communicate effectively through well-written technical documentation as well as audio-visual Presentations.
PO3: Recognize the importance of entrepreneurship and innovation to create value and health.
PO4: Acquire mastery in the topic of study at an exceedingly higher level.

Program Specific Outcomes (PSO) For M.Tech. Computer Science & Engineering (Data Science & Artificial Intelligence) (Part-Time)

After the completion of M.Tech. programme, the students will be able to:

PSO1: Attain comprehensive understanding of advanced theories and models in Computer Science, Data Science and Artificial Intelligence.
PSO2: Design, implement, and evaluate AI models and systems for real-world applications in diverse domains
PSO3: Realize data science pipeline by integrating data engineering, analytics, and visualization for enterprise solutions
PSO4: Enhance research skills and conduct independent research, which could lead to technological innovations and improvements in the field of AI and Data Science

DEPARTMENT OF COMPUTER SCIENCE
PROGRAMME STRUCTURE AND SYLLABUS (2025 ADMISSIONS)

M.TECH COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE & ARTIFICIAL INTELLIGENCE) [Part-Time]

Sl. No.	Course code	Course Title	Core / Elective	Credits	Lec	Tutorial	Lab	Marks
Semester - I								
1	24-475-0101	Probability and Statistics for Data Science	C	4	4	2	2	100
2	24-475-0102	Artificial Intelligence and Machine Learning	C	4	4	2	2	100
3	24-475-0103	Elective I	E	2	0	0	2	100
4	24-475-0104	Seminar	C	2	0	0	3	100
5	24-475-0105	Artificial Intelligence Lab	C	2	0	0	4	100
Total for Semester I				**14**	8	4	13	**500**
Semester - II								
1	24-475-0201	Applied Data Science	C	4	4	2	2	100
2	24-475-0202	Deep Learning	C	4	4	2	2	100
3	24-475-0203	Elective II	E	2	0	0	2	100
4	24-475-0204	Elective III	E	2	0	0	2	100
5	24-475-0205	Data Science Lab	C	2	0	0	4	100
Total for Semester II				**14**	8	4	12	**500**
Semester - III								
1	24-475-0301	Elective IV	E	2	0	0	2	100
2	24-475-0302	Elective V	E	2	0	0	2	100
3	24-475-0303	Dissertation & Viva Voce	C	18	0	0	20	100
Total for Semester III				**22**	0	0	24	**300**
Semester - IV								
1	24-475-0401	Dissertation & Viva Voce	C	22	0	0	30	100
Total for Semester IV				**22**	0	0	30	**100**
Total credits for Degree: **72**							Total Marks:	**1400**

Electives I - V can be either an approved MOOC course or a course offered by the department and shall decided by the Department Council (DC).

24-475-0101 Mathematics for Computing

Core/Elective: **Core** Semester: **1** Credits: **4**

Course Description

This course introduces the study of mathematical structures that are fundamentally discrete in nature. The course is intended to cover the main aspects that are useful in studying, describing, and modeling objects and problems in the context of Linear Algebra, computer algorithms, and programming languages.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	Course Outcome Statement	Cognitive Level
CO1	Analyze the different methods for proving the correctness of theorems and problems.	Analyze
CO2	Understand and apply the basic concepts of Linear Algebra.	Apply
CO3	Understand and apply the basic aspects of Descriptive statistics.	Apply
CO4	Understand and apply the fundamentals of probability theory.	Apply

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PS01	PSO2	PSO3	PSO4
CO1	3	-	-	-	3	3	-	2
CO2	3	3	-	-	2	2	-	2
CO3	3	3	-	-	2	2	-	2
CO4	3	3	-	-	3	2	-	2

Course Content

1. Introduction – proofs – propositions – predicates and quantifiers – truth tables – first order logic – satisfiability – pattern of proof – proofs by cases – proof of an implication – proof by contradiction – proving iff – sets – proving set equations – Russell’s paradox – well-ordering principle – induction – invariants – strong induction – structural induction
2. Vectors-Coordinate system-vector addition-vector multiplication-Linear combinations, span, and basis vectors-Matrix multiplication as composition-Three-dimensional linear transformations-The determinant-Inverse matrices, column space and null space- Nonsquare matrices as transformations between dimensions-Dot products and duality-Cross products-Cross products in the light of linear transformations-Cramer's rule-Change of basis-Eigenvectors and eigenvalues-vector spaces
3. Descriptive statistics: histogram, sample mean and variance, order statistics, sample covariance, sample covariance matrix – Frequentist statistics: sampling, mean square error, consistency, confidence intervals, parametric and non-parametric model estimation

4. Probability theory: probability spaces, conditional probability, independence – Random variables: discrete and continuous random variables, functions of random variables, generating random variables – Multivariate random variables: joint distributions, independence, generating multivariate random variables, rejection sampling – Expectation: Mean, variance and covariance, conditional expectation
5. Random process: definition, mean and autocovariance functions, iid sequences, Gaussian and Poisson process , random walk – Convergence of random process: types of convergence, law of large numbers, Central limit theorem, monte carlo simulation – Markov chains: recurrence, periodicity, convergence, markov-chain monte carlo- Gibbs sampling, EM algorithm, variational inference

References

1. Bronson, R., Costa, G.B., Saccoman, J.T. and Gross, D.,Linear algebra: algorithms, applications, and techniques.4e, 2023.
2. Eric Lehman, F Thomson Leighton, Albert R Meyer, Mathematics for Computer Science, 1e, MIT, 2010.
3. Susanna S. Epp, Discrete Mathematics with Applications, 4e, Brooks Cole, 2010.
4. Gary Chartrand, Ping Zhang, A First Course in Graph Theory, 1e, Dover Publications, 2012. in
5. John Tsitsiklis. 6.041SC Probabilistic Systems Analysis and Applied Probability. Fall 2013. Massachusetts Institute of Technology: MIT OpenCourseWare. https://ocw.mit.edu
6. Albert Meyer. 6.844 Computability Theory of and with Scheme. Spring 2003. Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu.
7. Michael Mitzenmacher and Eli Upfal; Probability and Computing, 2ed, Cambridge University Press, 2017

Online Resources: Course notes of Carlos Fernandez-Granda, DS-GA 1002: Probability and Statistics for Data Science https://cims.nyu.edu/~cfgranda/pages/DSGA1002_fall17/index.html

24-475-0102: Artificial Intelligence and Machine Learning

Core/Elective: **Core** Semester: **1** Credits: **4**

Course Description

Machine learning is programming computers to optimize a performance criterion using example data or past experience. This course is to discuss many methods that have their bases in different fields: statistics, pattern recognition, neural networks, artificial intelligence, signal processing, control, and data mining. Major focus of the course is on the algorithms of machine learning to help students to get a handle on the ideas, and to master the relevant mathematics and statistics as well as the necessary programming and experimentation.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	Course Outcome Statement	Cognitive Levels
CO1	Understand and explain the different types of the learning process, and key ethical considerations.	Understand
CO2	Learn to effectively prepare data for machine learning models through data cleaning, feature selection, and dimensionality reduction.	Apply
CO3	Implement and interpret linear and non-linear regression models, while comparing various classification techniques including tree-based, kernel, and ensemble methods.	Apply
CO4	Gain practical knowledge in identifying data clusters using various algorithms and discovering hidden patterns through association rule learning.	Apply
CO5	Understand the basic building blocks of neural networks, implement the backpropagation algorithm, and explore the concept of MDPs and Q-learning.	Understand

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PS01	PSO2	PSO3	PSO4
CO1	3	-	-	-	3	1	1	2
CO2	3	-	-	-	3	1	1	2
CO3	3	-	-	3	3	1	3	2
CO4	3	-	-	3	3	1	2	2
C05	3	-	-	3	3	1	3	2

Course Content

1. Introduction to AI - What is AI? A Brief History of AI - Different types of AI - Applications of AI -

Problem Solving Methods – Heuristics. Knowledge Representation and Reasoning - Planning and Decision-Making: Ethics and Societal Impact of AI.

2. Machine Learning Fundamentals - Concept of Machine Learning: Definition, applications, types of learning (supervised, unsupervised, reinforcement) - Hypothesis Spaces and Inductive Bias - Learning Process-Machine Learning Ethics and Bias. Data Preprocessing and Feature Engineering: Data Representation - Data Preprocessing - Features and Types - Dimensionality Reduction – Feature Identification - Feature selection – Feature extraction - Feature Importance-High dimensional data and Manifolds.
3. Regression and Classification - Regression: Linear Regression – Non-Linear regression – evaluation metrics for regression– Classification: Binary, multi-class, and multi-label classification – lazy learners - tree-based techniques - kernel-based techniques - probabilistic techniques - and ensembled techniques – evaluation metrics for classification.
4. Clustering and Rule Mining - Clustering: Partitioning based – hierarchical based – density based– grid-based – model based - Rule mining: Apriori algorithm, FB Growth - association rules. Outlier Detection - LOF.
5. Artificial Neural Networks and Reinforcement Learning -Neural Networks: McCulloch-Pitts neurons, Hebb's networks, Hopfield networks, Boltzmann machines, Perceptrons, multilayer perceptrons, backpropagation. Reinforcement Learning: Markov Decision Processes (MDPs), Q-learning.

References

1. Ethem Alpaydin, Introduction to Machine Learning, 3e, MIT Press, 2014
2. Tom M. Mitchell, Machine Learning, McGraw Hill Education; 1e, 2017
3. Stephen Marsland, Machine Learning, An Algorithmic Perspective, 2e, CRC Press, 2015
4. Giuseppe Bonaccorso, Machine Learning Algorithms, 1e, Packt Publishing Limited, 2017
5. Ethem Alpaydin, Machine Learning- The New AI, MIT Press, 1e, 2016
6. Andrew Ng, Machine Learning Yearning, ATG AI (Draft version), 1e, 2018
7. Rohit Singh, Tommi Jaakkola, and Ali Mohammad.*6.867 Machine Learning*. Fall 2006. Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu

Andrew Ng, https://www.coursera.org/learn/machine-learning

24-475-0104: Seminar

Core/Elective: **Core** Semester: **1** Credits: **2**

Course Description

The student has to prepare and deliver a presentation on a research topic suggested by the department before the peer students and staff. They also have to prepare a comprehensive report of the seminar presented.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	Course Outcome Statement	Cognitive Level
CO1	Find out relevant information for the topic.	Understand
CO2	Define clearly the topic for discussion.	Understand
CO3	Deliver the content effectively.	Apply
CO4	Organize the content with proper structure and sequencing.	Apply
CO5	Demonstrate the academic discussion skills to emphasize, and argue with clarity of purpose using evidence for the claims.	Analyze
CO6	Show the ability to evaluate and reflect on critical questions.	Analyze
CO7	Show attempts to reach across diverse disciplines and bring other schools of thought into the discussions.	Analyze

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	3	1	-	-	3	1	-	-
CO2	3	-	-	-	2	1	-	-
CO3		3	-	-	2	3	-	1
CO4	1	2	-	-	1	-	-	-
CO5	2	3	-	-	3	1	1	1
CO6	2	-	-	3	3	2	3	1
CO7	2	-	-	3	3	-	1	1

24-475-0105: Artificial Intelligence Lab

Core/Elective: **Core** Semester: **1** Credits: **2**

Course Description

The course aims to give valuable hands-on experience in designing, implementing, and evaluating AI solutions. Whether pursuing further study or entering the workforce, graduates of the AI Lab course will be well-equipped to tackle the challenges and opportunities presented by the rapidly evolving field of Artificial Intelligence.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	Course Outcome Statement	Cognitive Level
CO1	Become familiar with AI tools used in the industry and academic research	Understand
CO2	Apply machine learning concepts to real-world problems and tune parameters for best results.	Apply
CO3	Implement AI algorithms for a better understanding of the latest developments in this field.	Apply

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	2	-	2	-	3	2	2	1
CO2	2	-	-	-	3	2	2	1
CO3	3	-	-	2	3	2	2	1

Course Content

1. Write a program to solve n-Queens problem in AI
2. Write a program to solve BFS search in AI
3. Write a program to solve DFS search in AI
4. Write a program to implement Local Search using Hill climbing with random neighbor
5. Write a program to solve A* Search in AI
6. Write a program to solve AO* Search in AI
7. Write a program to implement alpha beta pruning
8. Write a program to solve Water jug problem in AI.
9. Implement different supervised learning models and evaluate its performance.
10. Implement different unsupervised learning models and evaluate its performance.
11. Implement the different model optimization techniques.

24-475-0201: Applied Data Science

Core/Elective: **Core** Semester: **2** Credits: **4**

Course Description

This applied data science course empowers you to transform diverse data sets into valuable insights that solve real-world problems. Embark on a journey through the complete data science lifecycle, mastering each step from identifying questions to crafting impactful stories with your findings. Gain hands-on experience with cutting-edge techniques while developing the ethical compass to use data responsibly across various industries.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	Course Outcome Statement	Cognitive Level
CO1	Navigate the Data Science Landscape: Grasp applications across industries, master the data science lifecycle.	Apply
CO2	Master Data Preparation & Engineering: Implement warehousing concepts, build efficient data pipelines, and ensure data quality.	Apply
CO3	Analyze Data with Confidence: Utilize descriptive statistics, hypothesis testing, regression models, classification algorithms, and clustering techniques for insightful analysis.	Analyze
CO4	Craft Compelling Data Visualizations: Design effective visuals using best practices and popular tools, and create impactful narratives to communicate findings.	Apply
CO5	Embrace DataOps & Big Data Technologies: Understand DataOps automation, implement CI/CD practices, explore big data technologies like Hadoop, Spark, and Kafka, and analyze challenges and opportunities presented by big data.	Analyze

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	2	2	2	-
CO2	2	-	-	3	2	3	3	-
CO3	2	-	-	3	2	2	1	1
CO4	2	3	-	1	2	-	-	-
CO5	3	1	-	2	2	2	1	1

Course Content:

1. Introduction to Applied Data Science - Overview of the data science landscape and its applications in various industries- The data science lifecycle: problem identification, data collection, data cleaning and preprocessing, analysis, modeling, and communication.- Ethical considerations in data science.

2. Data Warehousing and Engineering - Introduction to data warehousing concepts: dimensional modeling, star schemas, snowflake schemas, data marts. Data warehousing technologies: relational databases, data warehouses, data lakes.Data engineering: data extraction, transformation, and loading (ETL) processes, data pipelines, data quality management.

3. Data Analytics - Descriptive statistics: measures of central tendency, measures of dispersion, measures of association.-Inferential statistics: hypothesis testing, confidence intervals.- Regression analysis: simple linear regression, multiple linear regression- Classification: decision trees, random forests, support vector machines.-Clustering: k-means clustering, hierarchical clustering.

4. Data Visualization - Principles of data visualization: selecting the right chart type, using color effectively, labeling charts clearly. Tools for data visualization: Tableau, Power BI, matplotlib, seaborn. Storytelling with data visualization: how to create visual narratives that communicate insights effectively.

5. DataOps and Big Data- Introduction to DataOps: automating the data pipeline, continuous integration and continuous deployment (CI/CD), monitoring and alerting- Big data technologies: Hadoop, Spark, Kafka.- Challenges and opportunities of big data.

References

1. Applied Data Science with Python and Jupyter: Use powerful industry-standard tools to unlock new, actionable insights from your data; Alex Galea (2018); Packt Publishing. ISBN: 9781789951929.
2. Applied Data Science - Lessons Learned for the Data-Driven Business; Braschler, Stadelmann, Stockinger (Eds.); Springer(2019).
3. https://em360tech.com/sites/default/files/2020-08/DataOps%20Cookbook%202nd%20Edition%20FINAL.pdf
4. Data Warehousing and Analytics: Fueling the Data Engine; David Taniar, Wenny Rahayu;Springer Cham(2022); https://doi.org/10.1007/978-3-030-81979-8

24-475-0202: Deep Learning

Core/Elective: **Core** Semester: **2** Credits: **4**

Course Description:

Deep learning is part of a broader family of machine learning methods based on learning data representations, as opposed to task-specific algorithms. This course describes deep learning techniques used by practitioners in industry, including deep feedforward networks, regularization, optimization algorithms, convolutional networks, sequence modeling, and practical methodology. This course is useful to students planning careers in either industry or research, and for software engineers who want to begin using deep learning in their products or platforms

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	**Course Outcome Statement**	**Cognitive Level**
CO1	Understand the need for Deep learning, Feed-forward networks, Learning XOR, Gradient-based Learning, and Hidden units.	Understand
CO2	Differentiate between training error and generalization error, Underfitting and Overfitting. And Identify Regularization strategies, Dataset Augmentation, and Adversarial Training.	Analyze
CO3	Describe the working of Convolution Operation, Sparse interactions, Parameter sharing, Equivariant representations, Pooling and Recurrent Neural Networks	Understand
CO4	Understand different types of Autoencoders, Undercomplete Autoencoders, Regularized Autoencoders, Dimensionality Reduction.	Understand
CO5	Explain Deep generative models like Boltzmann Machines, Restricted Boltzmann Machines.	Understand

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	2	3	-	-	-
CO2	1	-	-	1	2	1	1	-
CO3	2	1	-	2	3	2	2	1
CO4	1	-	-	1	3	2	2	-
CO5	2	1	-	2	2	2	2	1

Course Content:

1. Deep Networks: Feed forward networks – Learning XOR- Gradient based Learning – Hidden units – Architecture design- Back propagation – Differentiation algorithms

2. Regularization for Deep Learning: Penalties-Constrained optimization-Under constrained problems- Dataset augmentation-Semi Supervised learning- Sparse representation- Adversarial training- Optimization for training deep models: Basic algorithms-Algorithms with adaptive learning rates

3. Convolutional Networks: Convolution-Pooling-Variants of pooling- Efficient convolutional algorithms – Recurrent and Recursive Nets: Recurrent Neural Networks- Deep Recurrent Networks-Recursive Neural Networks- Explicit memory

4. Linear Factor Models: Probabilistic PCA- ICA – Slow feature analysis – Sparse coding – Autoencoders: UndercompleteAutoencoders – Regularized Autoencoders- Learning Manifolds-Applications of Autoencoders – Representation learning

5. Deep generative models: Boltzmann Machines – RBM- Deep Belief Networks-Deep Boltzmann Machines-Convolutional Boltzmann Machines- Directed generative Nets

References

1. Nithin Buduma, Nikhil Buduma and Joe Papa, Fundamentals of Deep Learning, 2nd Edition, O'Reilly, 2022
2. Jon Krohn and Grant Beyleveld, Deep learning Illustrated, Addison-Wesley; 1st edition, 2019
3. M Gopal, Deep Learning, Pearson Education; 1st edition, 2022
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, 1e, MIT Press, 2016
5. Josh Patterson and Adam Gibson, Deep Learning: A Practitioner's Approach, 1e, Shroff/O'Reilly, 2017

24-475-0205: Data Science Lab

Core/Elective: **Core** Semester: **2** Credits: **2**

Course Description

This applied data science course empowers you to transform diverse data sets into valuable insights that solve real-world problems. Embark on a journey through the complete data science lifecycle, mastering each step from identifying questions to crafting impactful stories with your findings. Gain hands-on experience with cutting-edge techniques while developing the ethical compass to use data responsibly across various industries.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	**Course Outcome Statement**	**Cognitive Level**
CO1	Learn about software tools used in the field of data science.	Understand
CO2	Apply data science principles in practical situations to produce insights by processing data	Apply
CO3	Visualize insights in a manner conducive for decision-making.	Apply

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	2	-	-	-
CO2	-	-	-	3	3	-	2	-
CO3	-	2	1	-	-	2	-	-

Course Content:

Lab cycle 1

1. Download, install and explore the features of NumPy, SciPy, Jupyter, and Pandas packages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set
5. We want to investigate the behavior of the total positive COVID-19 cases weekly from 22 January 2020 to 15 December 2020 in India. Perform the following tasks:

Data set link https://raw.githubusercontent.com/datasets/covid-19/master/data/time-series-19-

covid-combined.csv

a. Univariate Time Series Analysis:
   i. Create a time series object for the total positive COVID-19 cases
   ii. Visualize the time series data using a line chart.
b. Multivariate Time Series Analysis:
   i. Also, consider the **total deaths** from COVID-19 during the same period.
   ii. Create a multivariate time series object that includes both the total positive case and total deaths.
   iii. Plot both series on a single chart.
c. Time Series Forecasting:
   i. Forecast the next 5 data points.
   ii. Plot the forecasted values.

Lab Cycle 2 – Data visualisation

1. Create a scatterplot of the Sepal.Length and Petal.Length variables in the iris dataset using the plot function? Add appropriate labels and title to the plot. Save the plot as a high-resolution image file.
2. Create a scatterplot of the mpg and disp variables in the mtcars dataset. Use different colors to represent the cyl variable and add a smooth line to show the trend. Add appropriate labels, title, and legend to the plot
3. Create a bar plot of the number of cylinders (cyl) in the mtcars dataset. Use different colors to represent the transmission type (am). Add appropriate title, labels, and legend to the plot.
4. Create a histogram of the miles per gallon (mpg) in the mtcars dataset. Use different shades of blue to represent the frequency of each bin. Add appropriate title and labels to the plot. Calculate and display the mean and standard deviation of mpg on the plot.
5. Create a box plot of the horsepower (hp) in the mtcars dataset. Use different shapes to represent the number of gears (gear). Add appropriate title, labels, and legend to the plot. Identify and label any outliers on the plot.
6. Create a time series plot using real-world data. (https://www.kaggle.com/datasets/niketchauhan/covid-19-time-series-data)

Lab cycle 3 – Exploratory Data Analysis and Regression

1. Perform EDA on "Titanic Dataset". You are given the Titanic dataset, which contains information about passengers on the Titanic, including their survival status, age, class, and gender.
   a) plot the histogram of Number of parents and children of the passenger aboard(parch).
   b) Perform a detailed EDA, including advanced statistical analysis, to explore factors influencing survival rates.
   c) Create a customized box plot to visualize the age distribution of survivors and non-survivors.

2. EDA on "Iris Dataset"
    a. For the Iris dataset, which contains measurements of various iris flowers, conduct an EDA.
    b. Determine if there are statistically significant differences in sepal lengths between different species using a suitable statistical test.
    c. Create a pair plot to visualize the relationships between all variables.

3. Suppose you have a dataset containing information about house prices (dependent variable, denoted as price) and the size of the houses (in square feet, independent variable, denoted as size). You want to build a linear regression model to predict house prices based on their size.

    a. Load the dataset https://www.kaggle.com/competitions/house-prices-advanced-regression-techniques
    3. Fit a simple linear regression model with price as the dependent variable and size as the independent variable.
    4. Calculate the regression coefficients (slope and intercept).
    5. Plot the regression line along with the scatter plot of the data points.

24-475-0303: Dissertation & Viva Voce

Core/Elective: **Core** Semester: **3** Credits: **18**

Course Description

The dissertation work spans two semesters. Through the dissertation work, the student has to exhibit the knowledge in terms of engineering or technological innovation or research ability to solve the contemporary problem. On completion of the work, the student shall submit a final dissertation report. The qualitative and quantitative results of the work will be evaluated through a viva-voce exam.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	Course Outcome Statement	Cognitive Level
CO1	Demonstrates in depth knowledge and thoughtful application through the detailed analysis of the problem chosen for the study	Analyze
CO2	Assess the gap by acquiring knowledge about the previous works, and its interpretation and application	Analyze
CO3	Demonstrates the design of the proposed methodology and its merits.	Analyze
CO4	Organize the interim dissertation content with proper structure and sequencing	Apply
CO5	Demonstrate the academic discussion skills to emphasize, argue with clarity of purpose using evidence for the claims.	Analyze
CO6	Show ability to evaluate and reflect on critical questions.	Analyze

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	2		1	2	2	-	-	-
CO2	2	-	1	2	1	1	1	-
CO3	2	-	-	2	2	1	-	1
CO4	-	2	-	1	1	-	-	-
CO5	-	3	-	2	2	2	1	1
CO6	2	-	-	2	2	2		2

24-475-0401: Dissertation & Viva Voce

Core/Elective: **Core** Semester: **4** Credits: **22**

Course Description

The dissertation work spans two semesters. Through the dissertation work, the student has to exhibit the knowledge in terms of engineering or technological innovation or research ability to solve the contemporary problem. On completion of the work, the student shall submit a final dissertation report. The qualitative and quantitative results of the work will be evaluated through a viva-voce exam.

Course Outcomes (CO)

After the completion of the course, the students will be able to:

CO	**Course Outcome Statement**	**Cognitive Level**
CO1	Demonstrates in depth knowledge and thoughtful application through the detailed analysis of the problem chosen for the study	Analyze
CO2	Assess the gap by acquiring knowledge about the previous works, and its interpretation and application	Analyze
CO3	Demonstrates the design of the proposed methodology and its merits.	Analyze
CO4	Organize the interim dissertation content with proper structure and sequencing	Apply
CO5	Demonstrate the academic discussion skills to emphasize, argue with clarity of purpose using evidence for the claims.	Analyze
CO6	Show ability to evaluate and reflect on critical questions.	Analyze

Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	2		1	2	2	-	-	-
CO2	2	-	1	2	1	1	1	-
CO3	2	-	-	2	2	1	-	1
CO4	-	2	-	1	1	-	-	-
CO5	-	3	-	2	2	2	1	1
CO6	2	-	-	2	2	2		2